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TECHNICAL MEMORANDUM

Date: June 26, 2009
To: Justin Jones
Cindy Edens
From: Erik Preston, EIT
John Perlic, PE
Subject: DIS Wheeler Site - Traffic Sensitivity Analysis
cc:
Project Number: 244-4575-005
Project Name: DIS - Wheeler Site Redevelopment

The purpose of this memorandum is to document the findings of the traffic sensitivity analysis required to meet condition #31 of the SEPA Mitigated Determination of Non-Significance (MDNS) for the Wheeler Site Redevelopment project. The condition calls for augmenting the Traffic Impact Analysis (TIA) with a traffic sensitivity analysis of the street improvements proposed for Jefferson Street, 14th Avenue, and the site access points. Since the last traffic impact analysis was submitted in March of 2008, the project size has decreased significantly. This reduction in employees and square footage significantly reduces the number of trips generated by the site.

Condition #31 reads as follows:

“Traffic Impact Analysis – The Applicant shall augment the TIA, during the design phase and in consultation with the Department of Transportation and the City of Olympia. The Applicant shall use a traffic simulation program to model and perform a sensitivity analysis for site AM and PM peak hour traffic volumes. These trips will be obtained using the average rates from the ITE Trip Generation Manual adjusted to account for real data based on the actual proposed occupants and activities of the Wheeler site. This data will be derived from current implementation of alternative transportation practices, such as flexible work schedules, carpools, vanpools and other trips saving measures consistent with industry practices that adjust AM and PM peak hour trips. This analysis shall evaluate the impact on the proposed 14th and Jefferson roundabout as well as all site access points. The results of the sensitivity analysis shall be reviewed by the Department of Transportation and the City of Olympia for concurrence. If modifications to the design are needed, the Applicant shall modify the roundabout design and the site access points as determined by the Department of Transportation and the City of Olympia to meet these peak hour conditions.”

Different trip generation methods to estimate the actual trips for the revised development proposal were based on the proposed occupants and activities of the site. The revised traffic volume projections based on

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the revised trip generation were used to conduct an analysis of the proposed roundabout at the intersection of 14th Avenue and Jefferson Street as well as the site access points. Due to the reduced project size and analysis results summarized below, a detailed micro-simulation of the traffic conditions may not be necessary to meet the condition of approval.

The Department of Information Services (DIS) who will occupy this building, participate in the Commute Trip Reduction (CTR) program. **Table 1** summarizes the calculation of the percentage reduction in vehicle trips as a result of the CTR program, taken from the most recent survey conducted May 2007.

Table 1. Commute Trip Reduction (CTR) Percentages Calculations Summary

	Weekly Total
Employee-Trips Made By Employees Working During Survey Week	1,425
Estimated ¹ Vehicle-Trips Made By Employees Working During Survey Week	1,096
CTR Percentage	23%

1. Assuming average vehicle occupancy (AVO) of 3.0 for Carpool (2-6), 5.0 for Vanpool (4-6), 7.0 for Vanpool (7+), and 2.0 for "Other".

Table 2 summarizes the gross number of trips generated by the previous submittal and compares them to the trip generation options for the updated site proposal. Note that the table does not include the trip credit for existing small office and daycare uses which would be calculated the same for each methodology.

Table 2. Trip Generation Summary and Comparison

Alternative	Land Use Type (ITE#)	Size/ Units	Trip Rates ¹	AM Peak Hour		PM Peak Hour	
				Total	In/Out	Total	In/Out
2008 Submittal – Original Size	Admin. Office >300 ksf	336,850	1.27, 1.22	428	377/51	411	127/284
	Warehouse/Storage	126,900	0.46, 0.48	58	48/10	61	15/46
	Gross Total	463,750		486	425/61	472	142/330
2009 Reduced Square Footage							
City of Olympia Square Footage	Admin. Office 100-199 ksf	199,000	1.55, 1.49	308	271/37	297	92/205
	Warehouse/Storage	163,000	0.46, 0.48	75	61/14	78	20/58
	<i>Less Commute Trip Reduction (CTR)</i>		-23%	-88		-86	
	Gross Total	362,000		295	256/39	289	86/203
ITE Employee Rates	General Office (LU# 710)	875 (emp.)	0.48, 0.46	420	370/50	403	69/334
	<i>Less Commute Trip Reduction (CTR)</i>		-23%	-97		-93	
	Gross Total			323	285/38	310	53/257

1. AM, PM trip rates. Rates in *italics* indicate approximated City of Olympia AM trip rates using AM/PM ratio of ITE trip rates.

As **Table 2** indicates, the two methods of calculating project trips yield very different results, ranging from 295 to 323 trips during the AM peak hour, and 289 to 310 trips for the PM peak. The traffic analysis was based on the ITE employee rates to be conservatively high and satisfy the conditions of the sensitivity analysis.

Roundabout Analysis

This section summarizes the operational analysis conducted for the proposed roundabout controlled intersection of 14th Avenue and Jefferson Street. *Sidra Intersection* software was used to conduct the 2030 design year analysis for the AM and PM peak hours. The assumptions used during the analysis are listed below.

- Existing Heavy Vehicle (HV) percentages and Peak Hour Factors (PHF) were used for the future conditions on all approaches, except the westbound (WB) PHF was assumed to increase from 0.80 to 0.90 during the AM peak hour due to the large growth in approach volume. This PHF increase is a common assumption in traffic studies with increased future traffic volume forecasts. This is still a conservative assumption considering that a 0.92 PHF is the default value in Sidra.
- Environmental Factor = 1.1 for both peak hours.
- ITE Employee method used to generate project trips.
- Intersection geometry was assumed to be identical to that proposed in the 2008 submittal, minus the WB right-turn slip lane.

Table 3 summarizes the intersection operations of the roundabout concept at 14th Avenue and Jefferson Street *without* the westbound right turn (WBRT) slip lane included in the original submittal. This analysis assumes the WB approach is served by two approach lanes; a shared through-left and a shared through-right. **Figure 1** illustrates a revised preliminary site plan and revised roundabout layout.

Table 3. 2030 14th/Jefferson Roundabout Operations - Revised Concept (No WBRT Slip Lane)

Approach	Channelization	LOS	AM Peak Hour			PM Peak Hour			
			Delay	V/C ¹	95 th Percentile Queue (feet)	LOS	Delay	V/C ¹	95 th Percentile Queue (feet)
SB Jefferson	L_LTR	C	20.3	0.55	120	B	12.9	0.33	58
WB 14 th	LT_TR	A	9.1	0.82	403	A	9.5	0.39	89
NB Jefferson	LTR_R	A	8.7	0.08	12	B	18.7	0.65	156
EB 14 th	LT_TR	A	9.8	0.14	21	B	12.3	0.73	175
Overall Intersection		B	10.5	-	403	B	13.0	-	175

1. LOS = Level of Service (A-F) following HCM 2000 Methodology for signalized intersections.

2. Average control delay in seconds per vehicle for entire approach using SIDRA Intersection software.

3. Volume-to-Capacity ratio for worst movement of an approach, and worst approach of the intersection.

As **Table 3** indicates, the intersection is projected to operate at LOS B during both peak hours in 2030 without the WBRT slip lane. All Approaches would operate at LOS C or better. The WB approach is projected to experience a 95th percentile queue length of 402 feet in 2030 during the AM peak hour. This queue would not block any other intersection or freeway ramp, leaving approximately 230 feet between the back of queue and the merge point between the I-5 SB off-ramp and WB 14th Ave SE.

The roundabout is projected to operate better than the signalized option proposed in the March 2008 TIA. The signal was projected to operate at LOS B with 16.8 seconds average delay during the AM peak hour with two approaches at LOS C, and would have required widening 14th Avenue to 7 or 8 lanes instead of reducing lanes to the 4 currently proposed. The signalized option would have caused more delay and created an intimidating environment for pedestrians by increasing their exposure to vehicles.

Site Access Analysis

This section summarizes the operational analysis conducted for the four proposed site access points on 14th Avenue (1), Jefferson Street (2), and 16th Avenue (1). Highway Capacity Software (HCS) was used to conduct the 2030 design year analysis for the AM and PM peak hours as required by the City of Olympia for stop-controlled intersections.

The garage-only access to/from 14th Avenue is restricted to right-in, right-out only. A short eastbound acceleration lane would be provided on 14th Avenue for the right-turns to better merge with traffic. However, traditional analysis tools do not properly reflect this advantage, so a conservative analysis was conducted that assumed no acceleration pocket. The trip distribution assumed that approximately 85% of the vehicles leaving the site destined for I-5 and Henderson Blvd would use the 14th Avenue exit from the parking garage. Approximately two-thirds of those arriving from the north via Jefferson Street and the west via 14th Avenue were assumed to enter the garage at the 14th Avenue driveway because it is the shortest route into the parking garage. The overall trip distribution percentages are identical to those shown in Figures 4a thru 4d in the TIA dated March 2008.

The north driveway on Jefferson Street is located approximately 250 feet south of 14th Avenue and would provide full access to/from Jefferson Street and serve the 19-stall surface parking lot. The south driveway on Jefferson Street serves the parking garage exclusively, with outbound traffic restricted to right-turns only to discourage traffic cutting through the neighborhood to the south.

A fourth access point connects to 16th Avenue via a short section of Cherry Street in the southwest corner of the site. This access serves the loading docks, service entrance, cooling towers, and generator building. Only a few trips are expected to and from this access point during the peak hours.

Table 4 summarizes the operational analysis conducted for these four intersections during both the AM and PM peak hours of the 2030 design year.

Table 4. 2030 Site Access Operational Analysis Summary

Intersection	AM Peak Hour			PM Peak Hour		
	LOS ¹	Delay ²	WM ³	LOS ¹	Delay ²	WM ³
North Garage Access / 14 th Avenue	A	9.2	NB	D	34.9	NB
NW Surface Parking / Jefferson Street	A	8.6	WB	B	11.7	WB
SW Garage Access / Jefferson Street	A	8.7	WB	B	10.8	WB
Service Access (Cherry Street) / 16 th Avenue	A	8.9	SB	A	8.9	SB

1. LOS = Level of Service (A-F) following HCM 2000 Methodology for stop-controlled intersections.

2. Average control delay in seconds per vehicle for the worst movement of a stop-controlled intersection.

3. The Worst Movement (most delay) of a stop-controlled intersection.

As **Table 4** indicates, all site access locations are projected to operate at LOS D or better. In addition, the analysis indicates that the longest on-site queue projected is about 3 vehicles, or about 75 feet, at the north parking garage access to 14th Avenue during the PM peak hour.

Conclusions and Recommendations

The most conservative trip generation method was used to estimate the trips generated by the revised (smaller) development proposal. The proposed roundabout at the intersection of Jefferson Street and 14th Avenue is projected to operate at LOS B during both peak hours with no approaches worse than LOS C in the 2030 design year with the WB right-turn lane removed. Without the right-turn lane, the WB approach

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is projected to experience a 95th percentile queue of 403 feet during the 2030 AM peak hour. Therefore, the westbound right-turn lane is not needed in the design of the roundabout as previously thought.

All site driveways are projected to operate at LOS D or better during both the AM and PM peak hours. As such, single-lane entries and exits will be sufficient and no further design modifications are needed.